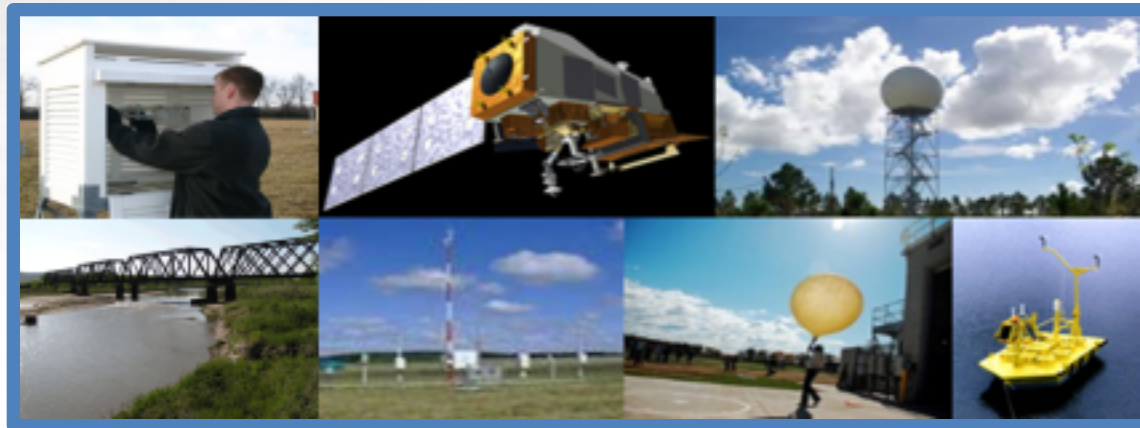


Satellite Observations that Support a Weather-Ready Nation

NOAA Satellite Conference 2017

Joseph A. Pica
Director, Office of Observations
National Weather Service



Increasing Societal Vulnerability to Environmental Hazards

Average Year

26,000
Severe
Storms

6 Atlantic
Hurricanes

1,300
Tornadoes

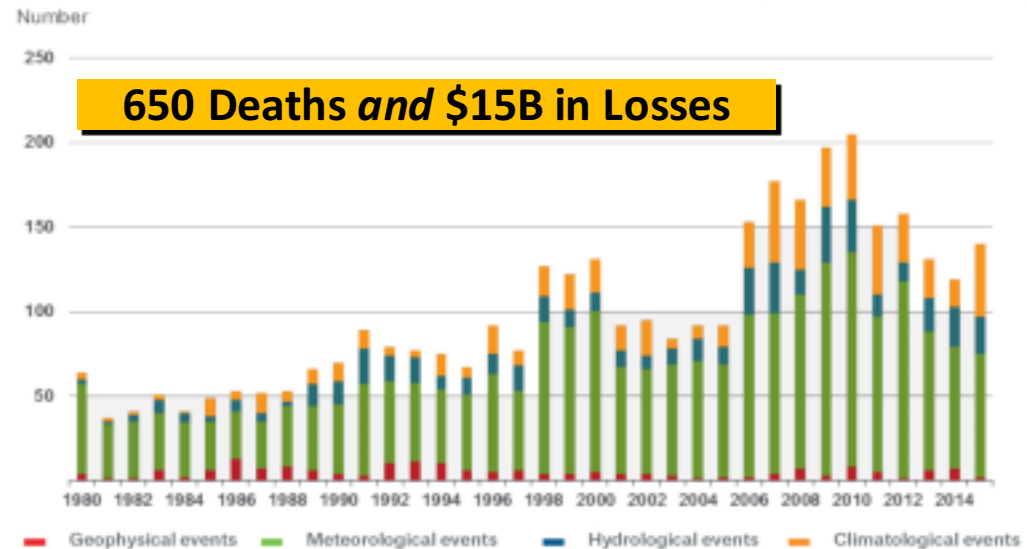
5,000
Floods



4 out of 5 Americans live in counties that have been declared weather-related disaster areas in the past six years*

Loss Events in the US (1980-2015)

Munich RE 



Factors contributing to increased vulnerabilities

- ✓ Increasing population in vulnerable areas
- ✓ More infrastructure at risk to extreme events
- ✓ Signs of a changing climate
 - Sea-Level Rise

Meanwhile we are now predicting extreme events out to a week in advance!

Realizing the Full Value of Forecasts:

Connecting Forecasts to Critical Decisions

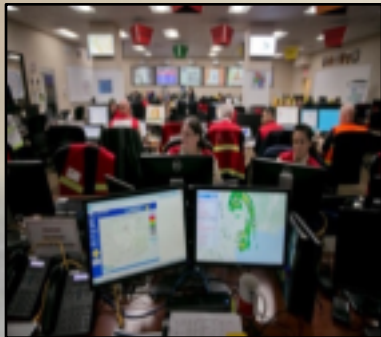
Generating
forecasts
and warnings



Connecting those forecasts &
warnings with impacts (IDSS)
"Impact-based Decision Support Services"

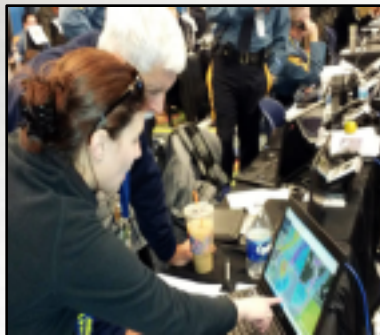


**Realizing Intrinsic
Value and
Mission Success**



Provide the best
hydrological and
meteorological
forecasting in the
world

Develop
relationships and
know partner
needs



Explain
uncertainty



Support partner
decision making
before, during, and
after events

Embed
when
needed



Build trust



NWS Strategic Outcome: *A Weather- and Water-Ready Nation*



“Ready, Responsive, Resilient”

Better forecasts and warnings...

Actionable environmental intelligence...

Consistent products and services

Connecting forecasts to decisions

*Involves the entire US Weather, Water and Climate Enterprise **WORKING TOGETHER***

*We have **5700+** WRN Ambassadors*

Today's Weather Forecast

Everything you read, see or hear about weather, climate and ocean forecasts is based on numerical prediction models

Four Essential Components of the Prediction Enterprise

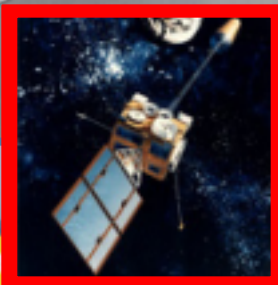
- Global Observations
 - ~2B/day
 - 99.9% remotely sensed
 - Satellites, radars, aircraft, buoys, radiosondes
- Data Assimilation & Modeling/Science
 - Earth System Model (Atmosphere, Ocean, Land, Ice)
- Supercomputers
 - Computing: Primary/Backup each @ 2.8PF runs with 99.9% reliability
- Forecaster Skill



How We Do It:

The Forecast Process

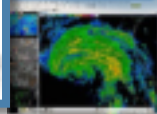
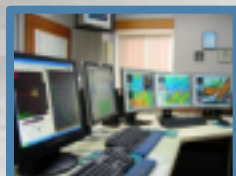
Satellites



Observations



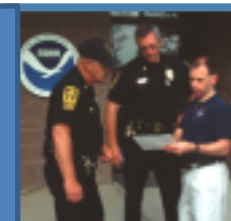
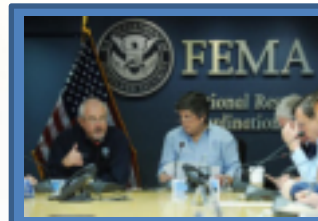
Central Processing



Science & Technology Integration

R2O

O2R



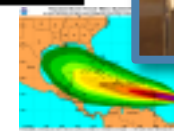
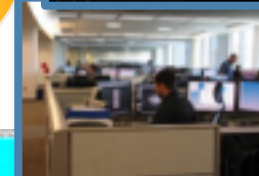
Dissemination



Analyze, Forecast, & Support

Central Guidance

Local Forecasts



Satellite User Readiness is Critical!

- We (Team NOAA) are ensuring satellite readiness from an end-to-end perspective.
 - Begins years prior to launch: GOES-R leading the way
 - Ensures earliest data delivery right to our forecasters' fingertips and to numerical models
 - Leads to impact-based decision support for emergency management community, etc.
- Before launch and then during the engineering checkout phase
 - Test and evaluation with simulated data, review during calibration activities, etc. to ensure Day 1 readiness
 - Very different from 20 years ago when a lot of the readiness work took place 1-2 years after the launch.

Early Use of GOES-16

- GOES-R Series is a “game changer” with exciting new capabilities that are being used in “operational” mode and saving lives
 - Revolutionary capability will "redefine Mesoscale Meteorology“
 - Unprecedented and unforeseen use for fire weather support
 - New GOES Lightning Mapper showing great promise
 - Space Weather continues as a key mission
- This is excellent example of the benefit of end to end user readiness enabling quick adoption of new capabilities



1 0001 G-16 IMG 2 20 JUN 17171 162719 02878 00012 01.00

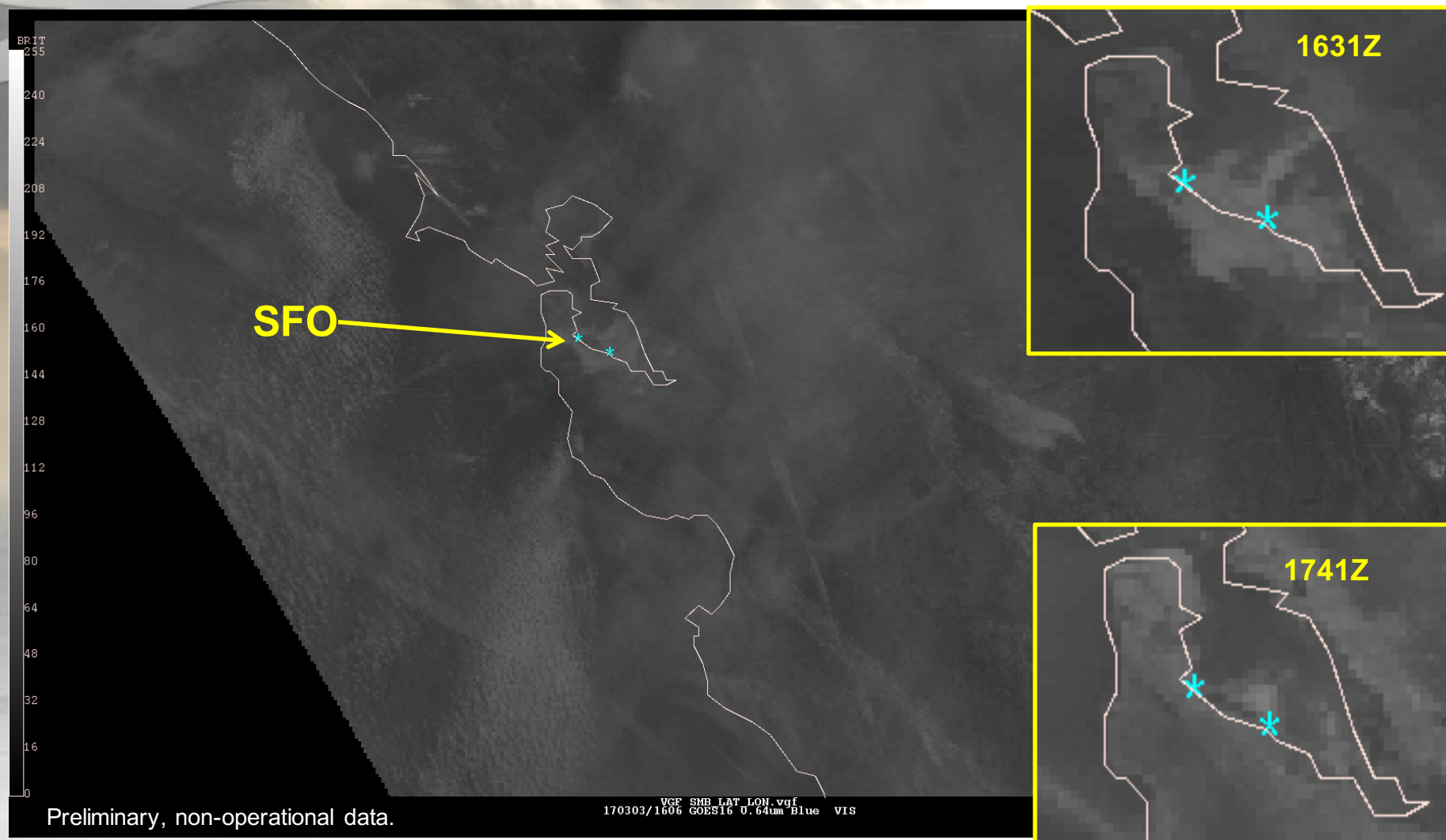
CIARA/RAMMB



Dr. Uccellini Testimonial

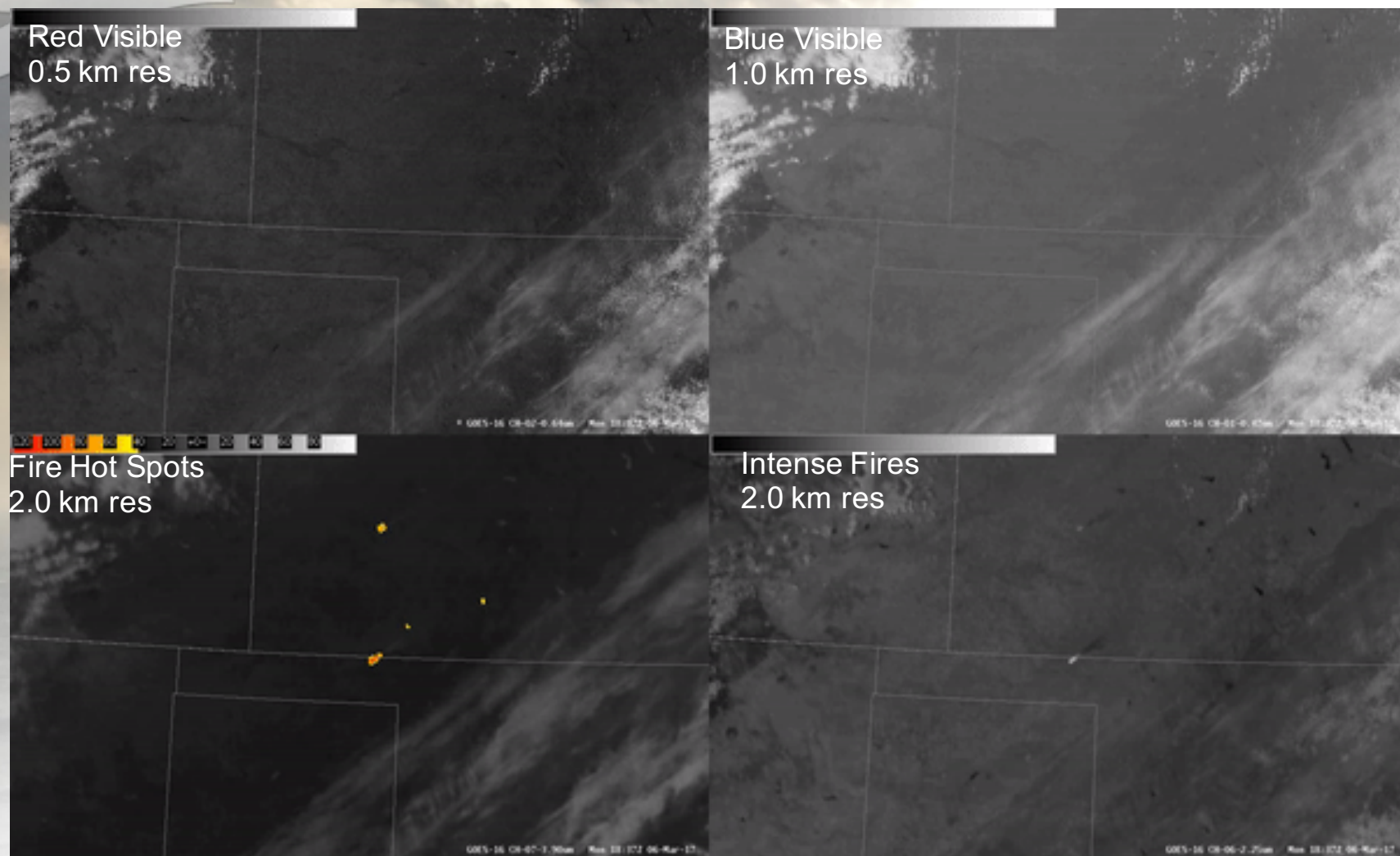
“GOES 16 is allowing us to routinely visualize the wonders of the mesoscale structure and evolution within the various circulation regimes for the first time. Will likely revolutionize our basic understanding of mesoscale circulation systems, especially as the theoretical members start sinking their teeth into what we are seeing. And to think we have been amazed ... yet we are still in the engineering checkout phase.”

Aviation Weather “Game Changer”



Original Ground Delay Program affected 48 flights, reduced to 16 with GOES-16.

Fire Weather “Game Changer”



Afternoon Evolution of Front and Fires (~1:30-6:00pm)

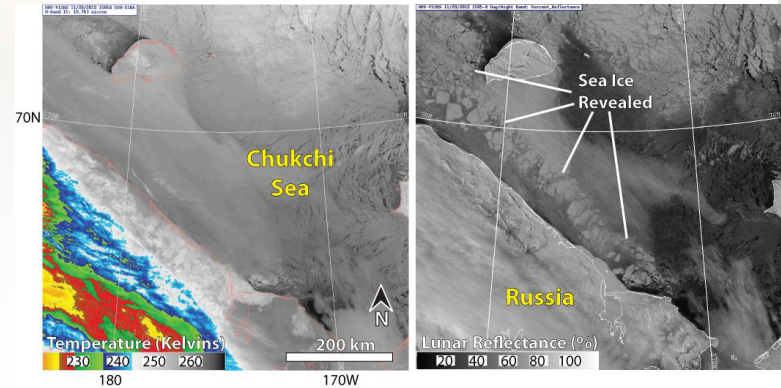
Excerpt from GOES 16 training film from Operations Proving Ground related to fire weather -- this is unprecedented.

Full video is here: <https://youtu.be/P1oVI9nL9LQ>

Credit – Kim Runk, NWS Operations Proving Ground

More Capability on the Way

- JPSS
 - Day-Night Band applications
 - AMTS and CrIS radiances in models
- GOES-S
 - Revolutionary capability for Western U.S. and Pacific
- COSMIC 2A
 - 1800 soundings a day in the tropics is eagerly anticipated



Summary

- We're building a Weather-Ready Nation to mitigate our growing vulnerability to high-impact weather
- Satellite data remains critically important to the forecast and warning mission of the NWS and to the global weather enterprise
- End-to-end user readiness is critical to optimal use of new satellite capabilities
- There is tremendous enthusiasm with respect to the new satellite capabilities becoming operational!!!



Thank You!